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ABSTRACT

Cable television's potential for providing new and attractive types of services will best be realized if the public can be assured of privacy of information transmitted specifically to their terminals and of the right to view any channel without information being gathered as to which channel is being watched at any particular time. It appears that an attractive and relatively inexpensive means of providing both private communications and premium television devices to homes and other potential subscribers would be to include an external unit, located either in a local distribution center or at the input to the subscriber's dropline. This external unit, developed by the MITRE Corporation, would contain a means for remote channel-selection by the subscriber, as well as address-gating and subscriber-response units. (Author/SH)

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PRIVACY

FOR

CABLE SERVICES

MAY 1972

THE MITRE CORPORATION

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FRANK R. ELDRIDGE

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THE MITRE CORPORATION
WASHINGTON OPERATIONS

ABSTRACT

This paper reviews the need for the next generation of urban cable systems to provide various types of private cable services. It reviews current methods of providing Premium TV services, and various types of video channel switching and channel selection systems, as well as the types of address gating systems currently being developed and demonstrated by The MITRE Corporation on the Reston, Virginia, cable system. Finally, it discusses the possibility of developing a composite channel-selection-and-address-gating system that appears to offer an attractive and relatively inexpensive means of providing both private services and Premium TV services in future urban cable systems.

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PRIVACY FOR CABLE SERVICES

WHY PRIVACY

For many years cable has spread throughout the rural areas by providing improved signals where off-the-air reception is poor. However, saturation of cable systems in these areas is rapidly approaching. New opportunities for viable systems, that supply only off-the-air signals, are becoming harder and harder to find.

In order to reach into cities, where many satisfactory off-the-air signals are already available, cable must supply a number of new and attractive types of services.[1] Many of these potential services will require at least some degree of privacy to be both effective and acceptable to the public. Mail delivery, bank-account information, credit checks, stock portfolio information, and access to personal files, are all examples of services that will require privacy. Security of files of private information stored in central processing units and transmitted to thousands of terminals in homes and offices, served by the cable system, will be needed. Many people will demand not only complete privacy of information transmitted specifically to their terminals but also a right to view any channels without information being gathered on which channels they are tuned into at any particular time.

What means are available, then, to designers and operators of these new types of cable services, that will guarantee these types of privacy?

The literature contains many articles that present possible ways of maintaining security of private files stored in central computer memory banks.[2] These include special computer programs that store private information in a number of preselected sections of a memory bank, and the use of unique codes or passwords to gain access to these private sections of a memory bank.

There has also been a great deal of discussion on how user privacy in viewing of open channels should and could be maintained.[3]

However, the problem of how to maintain the security of private information transmitted to terminals in homes and offices throughout a cabled city has received relatively little attention. This is the problem that is focused upon here.

CHANNELS AND SERVICES

A categorization of the types of cable channels that will be involved in these types of cable systems is shown in Figure 1. It is expected that most cable systems will eventually carry both downstream channels from headends to the system terminals, and upstream channels from the terminals to the headends. The downstream channels can be classified as follows:

- Subscription channels – That is, channels provided to subscribers for a monthly fee, and which carry open services, available to everyone as in conventional CATV, as well as private services, available only to designated individual terminals.

- Exclusive channels – That is, channels that are provided to subscribers and other users of the system for an extra fee. These channels will carry Premium TV, and utility services, such as meter reading, or selective power control, as well as various types of maintenance services, etc.

In general, urban cable systems can be expected to carry both one-way and two-way services on the subscription channels. The one-way services will be provided on downstream channels carrying conventional video signals at 60 fields per second and will be received on standard TV sets.

Several types of two-way systems are being developed for use in future cable operations.[4] These will carry both conventional and time-shared video and data signals on downstream channels, as well as time-shared data signals on upstream channels.

The types of services that can be provided by one-way and two-way systems are shown in Table 1. The one-way subscription services will include local and imported off-the-air signals, mechanical signals, local programming, new movies, local sports events and other programs that will normally be carried on the open-service channels and can be tuned-in by any subscriber. In general, it is expected that private services will not be provided on conventional one-way systems, but rather on two-way, using time-sharing and address-gating techniques, as discussed later. Such modes will enable available channel space to be used more effectively.

As indicated in Table 1, the two-way system could carry a variety of services such as polling services, computer-aided instructions, slide lectures, social services, video library, shopping and reservation services, and a variety of others on time-shared open channels available to all subscribers. On the time-shared private channels they could provide services such as mail delivery, bank account information, credit checks, stock portfolio information, and access to personal files.

Private transmissions using two-way time-shared channels will, in most cases, be originated from private sources, stored and retrieved from private data banks, and addressed to unique terminals in the cable system.

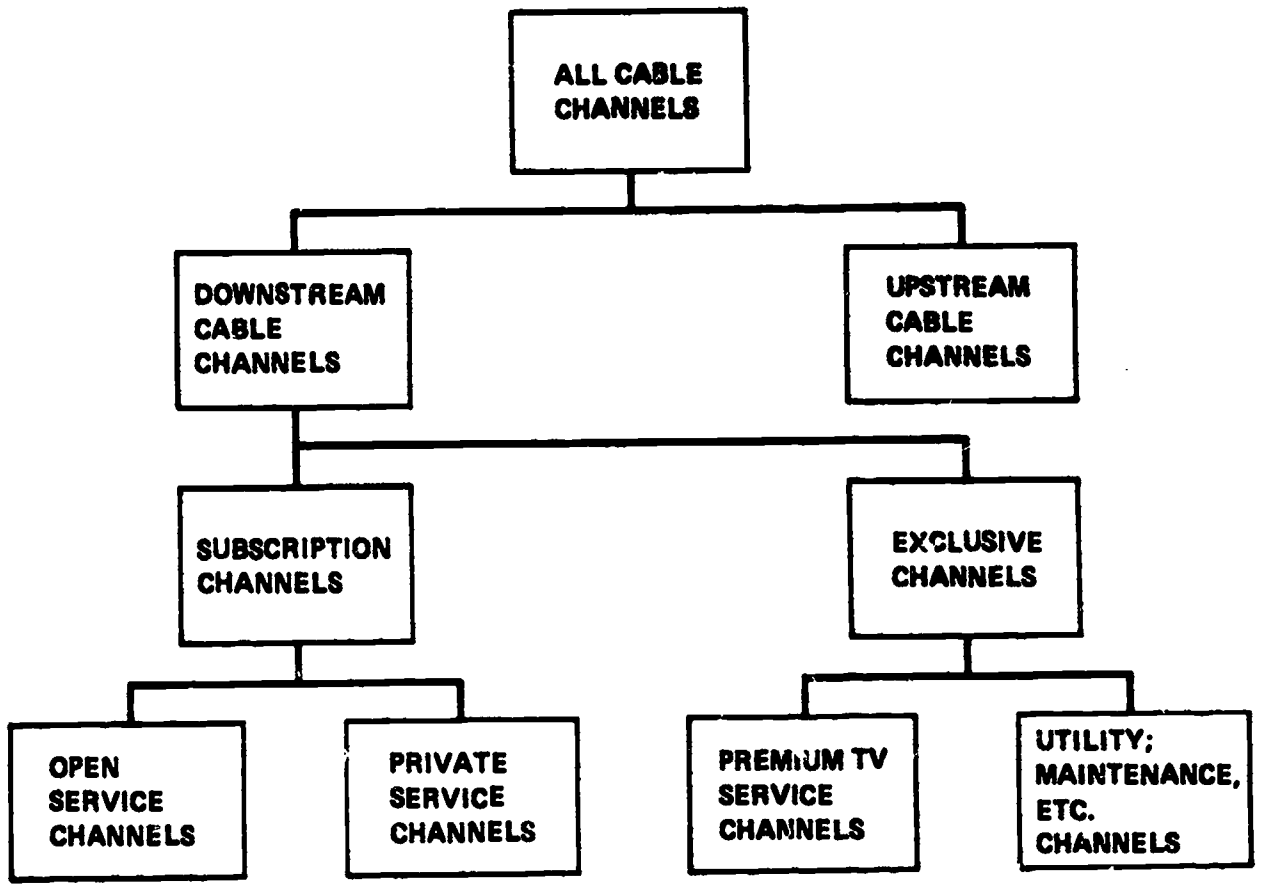

FIGURE 1
CLASSIFICATION OF CABLE CHANNELS

TABLE 1
TYPES OF SUBSCRIPTION SERVICES PROVIDED

	ONE-WAY SYSTEMS	TWO-WAY SYSTEMS
OPEN CHANNELS	• LOCAL SIGNALS • MECHANICAL SIGNALS • IMPORTED SIGNALS • LOCAL PROGRAMMING • NEW MOVIES • LOCAL SPORTS EVENTS • ETC.	• POLLING SERVICES • COMPUTER-AIDED INSTRUCTION • SLIDE LECTURES • HOME COMPUTER • SOCIAL SERVICES • VIDEO LIBRARY • SHOPPING SERVICES • RESERVATION SERVICES • ETC.
PRIVATE CHANNELS	NONE	• MAIL DELIVERY • BANK ACCOUNT INFORMATION • CREDIT CHECKS • STOCK PORTFOLIO INFO. • ACCESS TO PERSONAL FILES • ETC.

In contrast, Premium TV services, such as first-run movies, special national sports events, and various types of special cultural events will, generally, be cablecast on exclusive channels to large audiences.

PREMIUM TV

At present, a number of Premium TV Systems are being developed for use on cable.[5] Many of these are, currently, aimed primarily at hotel and motel applications. Some of these types of systems are summarized in Table 2. Most of the currently available Premium TV systems would use One-Way cable. Many of the systems transmit signals that are scrambled by removal of the sync pulses, or the signals are switched-on at the viewing terminal by a central control-station. None of these currently available Premium TV Systems would be suitable for sending large numbers of short, individual private messages addressed to any of thousands of specific terminals in a large city.

SWITCHING SYSTEMS

One class of systems that should be considered as having the potential for providing privacy of information transmitted via cable, are switching systems, such as those produced by Rediffusion[6] (i.e. The Dial-a-Program System) and Ameco[7] (i.e. the DISCADE System). However, it should be noted that the switching in these systems, as currently designed, is controlled by the viewer rather than the sender. Each viewer, therefore, would have access to all messages on every time-shared private channel to which he had access through the local switching center. A possible means of overcoming this problem would be to supply these switching systems with address gating such as is being done for the MITRE TICCIT System.[8]

ADDRESS GATING

In the TICCIT System each conventional TV field carries an address, in the form of a series of bits inserted before the vertical retrace period that precedes the field. If the address of a field matches that of an address decoder that is inserted in the system, it passes through a corresponding gating circuit and is received by the terminal to which it is addressed. A unique address is provided for each terminal. Such a configuration is shown schematically in Figure 2. A device such as this, which is operative in Reston, Virginia, is shown in Figure 3, with the top removed.

One problem in regard to the privacy of the address-gating as presently operated on the MITRE TICCIT System in Reston is that all messages carried by each channel are sent to each home and could be taped and read by every user of the system. Since an important objective, here, is to maintain security for all private messages on these channels, each subscriber's address decoder and gating circuit should be located outside of his home and preferably in a local distribution center such as the strand-mounted Area Distribution Center in the case of the DISCADE System, or in the Program Exchange Center, in the case of the Dial-a-Program System. This will prevent each subscriber from having access in his home to everybody's private messages on the time-shared private channel to which he has switched. By locating his address decoder and gating circuit outside of his home, only those private messages addressed to him will reach his home.

TABLE 2
SUMMARY OF PREMIUM TV SYSTEM DEVELOPMENTS

NAME OF SYSTEM	TYPE OF CABLE SYSTEM REQUIRED	METHOD OF EXCLUDING NON-PAYING VIEWERS	METHOD OF ACCOUNTING FOR SERVICE CHARGES	ESTIMATED INCREMENTAL CAPITAL COSTS
BTVision	One-Way	Video sync pulse and audio signal sent on separate channels, and recombined with video signal at receiver	Identification code for each program recorded on audio cassette and returned, periodically, by mail	$100 per Terminal
EnDeCODE	One-Way	Similar to BTVision	Fixed rate for service	$40 per Terminal
Computer Television	Two-Way	Viewer transmits program requests to central control station via cable. Central control remotely sets varactor tuners in subscriber terminals	Central control records programs requested	$600 per Terminal
K'Son	One-Way	Viewer telephones requests to central control station. Central control remotely sets program selector units to desired channel	Central control records programs requested	$100 per Terminal
Optical Systems	One-Way	Encoded signals sent from headend which are decoded at receiver by use of decoder cards or plug-in decoder cartridges	Viewer buys decoder cards or plug-in decoder cartridges for series of programs	$35 per Terminal
Phonevision and Theatre VisioN	One-Way	Encoded signals sent from headend which are decoded at receiver by subscriber ticket and decoder control unit	Viewer buys decoder tickets for individual programs	Not specified

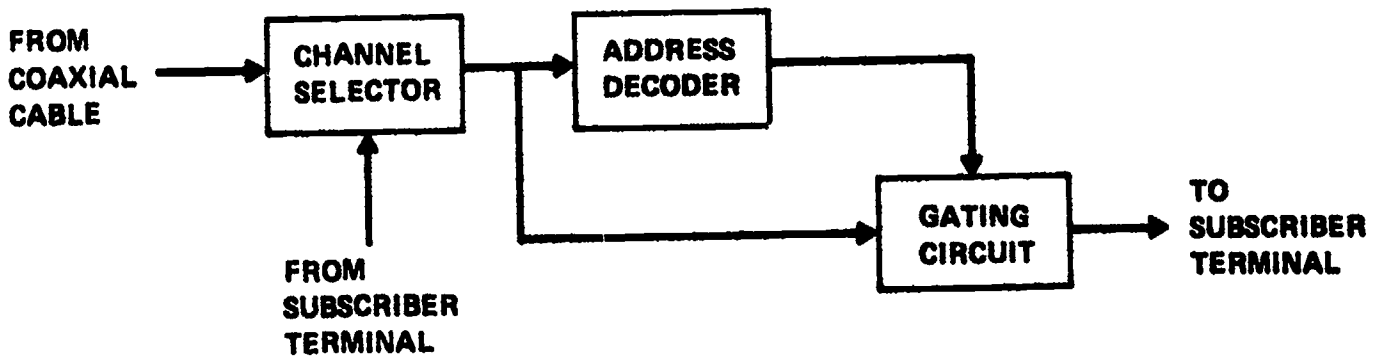

FIGURE 2
SYSTEM FOR CHANNEL SELECTION AND ADDRESS GATING

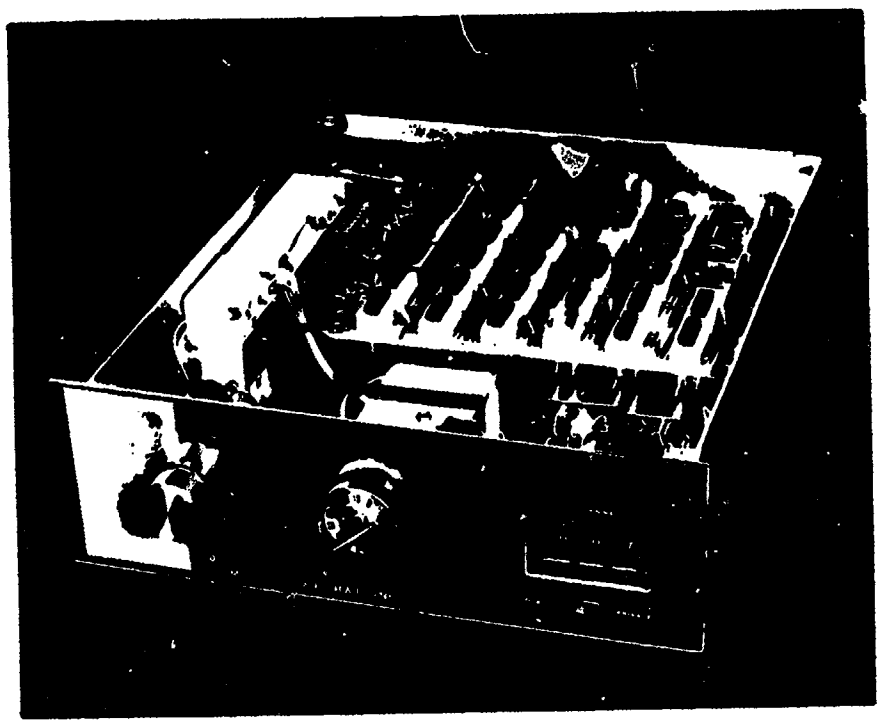

FIGURE 3
MITRE ADDRESS GATING SYSTEM

VARIATIONS

There are many possible variations on this type of privacy system. For instance, an alternative would be to eliminate the use of a local distribution center and, instead, to locate the channel selector, address decoder and gating circuits, shown in Figure 2, in an external unit at the input end of the subscriber's dropline, either on a utility pole or in an underground conduit, and to provide for remote tuning of the channel selector from the subscriber's terminal.

In still another version, a Premium TV mode could be added to the system. Each Premium TV field would carry a "price-per-field" code as well as a Premium TV address code. Each subscriber's external unit, in addition to the subscriber's unique address decoder, would contain a Premium TV channel address decoder which would be the same for all Premium TV subscribers. When the subscriber tunes into a Premium TV channel, these fields would pass through the Premium TV gating circuit as shown in Figure 4, and the count of the "price-per-field" code would be registered in the Subscriber-Response Unit, the details of which are shown in Figure 5. The Premium TV field would then pass to the home terminal unit. The price information would be sent to a central processing unit for billing purposes.

Likewise a private mode field, bearing the subscriber's address, would be passed to the subscriber's terminal unit and through a refresh unit if field-stopping is required.

Open channel signals would be passed directly to the home terminal unit from the remote channel selector and converter.

A keyboard would be supplied in the home terminal unit for generation of upstream signals through the Subscriber-Response Unit for functions such as opinion polling, catalogue shopping and reservation services. This unit could also be used for meter reading, selective power control, maintenance checking, burglar alarms, fire alarms and other sensor interrogation services.[9]

COSTS

Recent studies[1] have indicated a comprehensive two-way terminal of the type described above, in production quantities, would cost anywhere from $327 to $627 without privacy or Premium TV modes. It is estimated that the cost of extra components needed for these modes and packaging and weatherproofing of the components that would be located in the external unit, would add about 10% to these costs.

SUMMARY

In summary, it appears that an attractive and relatively inexpensive means of providing both private communications and Premium TV services to homes, and other potential subscribers, would be to include an external unit, located either in a local distribution center or mounted on a pole or in an underground conduit at the input to the subscriber's dropline. This external unit would contain a means for remote channel-selection by the subscriber, as well as address-gating and subscriber-response units.

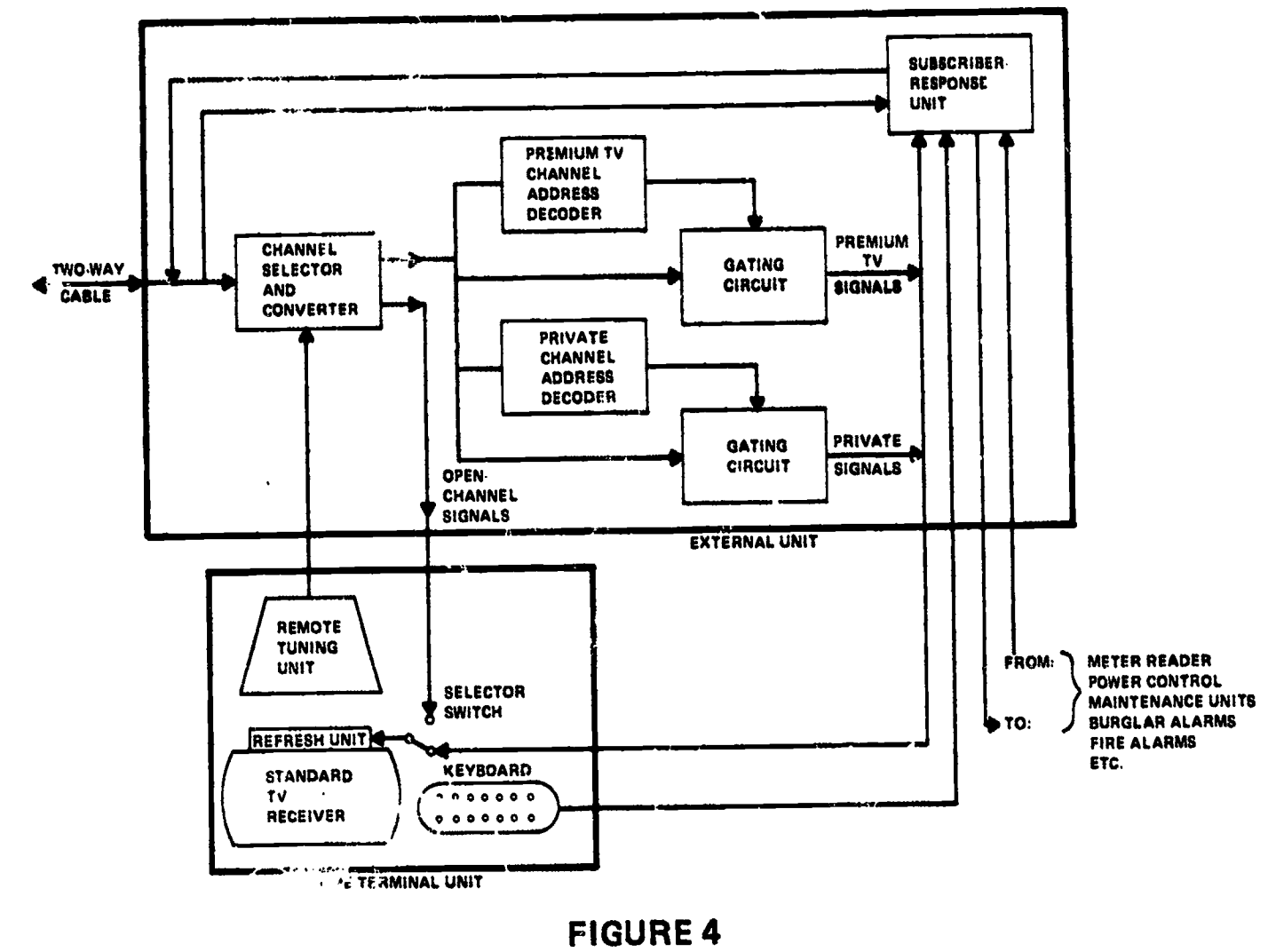

FIGURE 4
UNIVERSAL TERMINAL

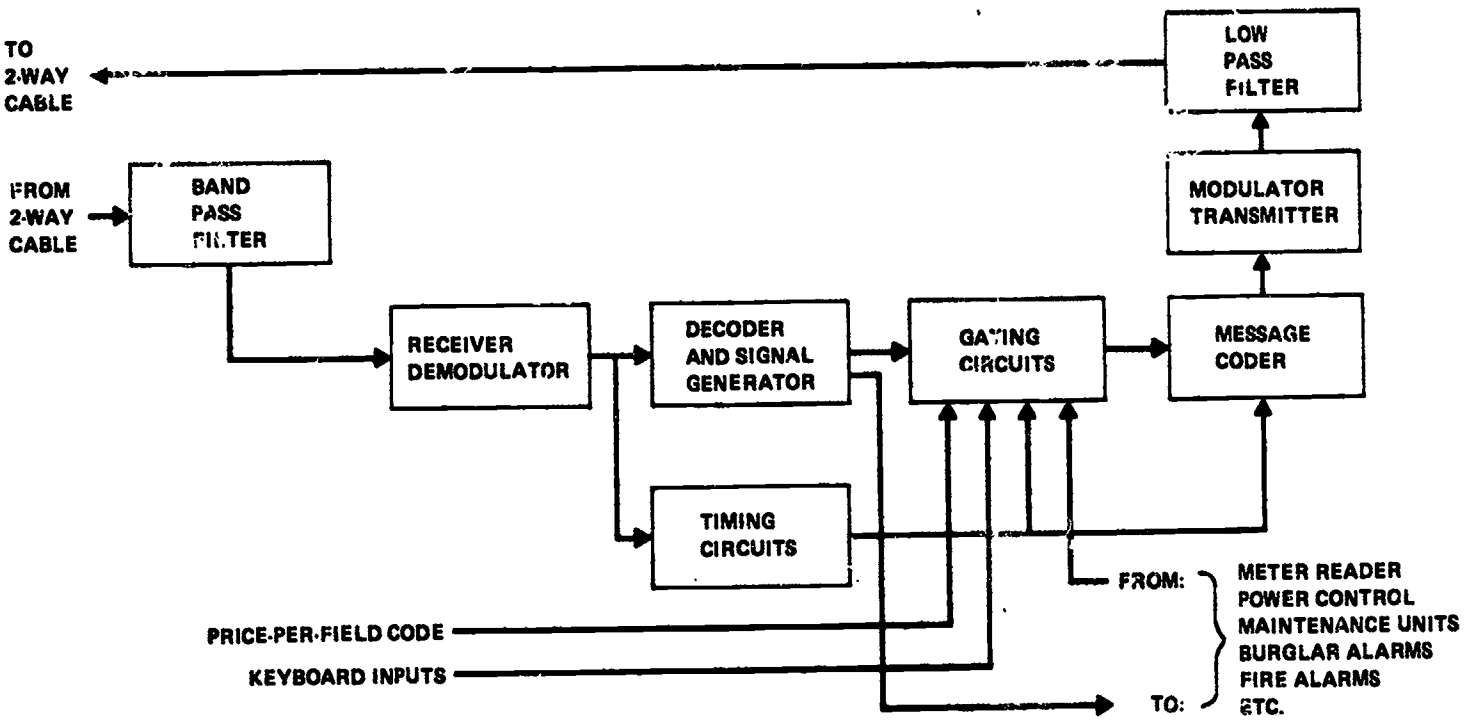

FIGURE 5
DETAILS OF SUBSCRIBER-RESPONSE UNIT

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